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Living coelacanths: values, eco-ethics and human responsibility

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ABSTRACT: Coelacanths *Latimeria chalumnae* are the only living representatives of crossopterygian fish close to the roots of our own vertebrate history and therefore occupy a unique position among living fossils. *L. chalumnae* has become a synonym for long evolutionary age, timeless existence, tenacity, immortality and links to old roots, appearing in language, poetry, fiction and many art forms. It is a symbol of a new national identity in the Comoro Archipelago, Western Indian Ocean. I consider here the intrinsic and extrinsic value of coelacanths and the role of these fish in biodiversity conservation. The fate of coelacanths lies in our hands. It will be a measure of the success or failure of 'eco-ethics' as recently defined and called for by ecologists.

KEY WORDS: *Latimeria* · Conservation · Living fossil

INTRODUCTION

The coelacanth *Latimeria chalumnae* is the sole survivor of an ancient Devonian lineage of crossopterygian fish which played a pivotal role in the evolution of land-living tetrapods. A species with an extremely slow evolutionary rate (e.g. White 1953), *L. chalumnae* is of high interest for evolutionary biology. It represents the classic text book example of a 'living fossil' (Forey 1984, 1990, Thomson 1991).

To our knowledge coelacanths now exist only in a small breeding population off 2 islands in the Comoro Archipelago, Western Indian Ocean. First field studies revealed that the small insular population is faced with the threat of extinction. There has been increasing concern about this as well as increasing activity aimed at ensuring its survival (Fricke et al. 1995).

J. L. B. Smith, the scientific discoverer of *Latimeria chalumnae*, called the fish a priceless heritage from the past (Smith 1963). Assigning intrinsic values to ecosystems, species or even genes in such a manner has become part of recent conservation attempts (i.e. Coulter & Mubamba 1993, Callicott 1994, Wallace 1994, More et al. 1996). There exist differences in philosophical and ethical argumentation focussing on such intrinsic-value concepts and their usefulness for biodiversity conservation (e.g. Oldfield 1995, Taylor 1996). I review here intangible and tangible values of the fish which should assist in improving concepts used in conservation.

This paper follows the classification of Oldfield (1995) and her definition of a species value: 'an estimation of general worth, usefulness, importance or monetary price of a good, amenity or service'. The future of *Latimeria chalumnae* depends acutely on human behavior. It may become a symbol of the effectiveness of 'eco-ethics' as defined and called for by Kinne (1997).

Coelacanths are caught with increasing intensity by deep-lining fishermen—the sole 'predator' of this fish (Millot et al. 1972, Stobbs & Bruton 1991, Plante et al. in press). The future of coelacanths depends now on immediate and sound economic, political and scientific policies and on the education and economic support of their main predator, the fishermen.

HISTORY OF DISCOVERY AND RESEARCH

In 1938, the first living coelacanth was trawled off the east coast of South Africa (Smith 1939, 1940). The

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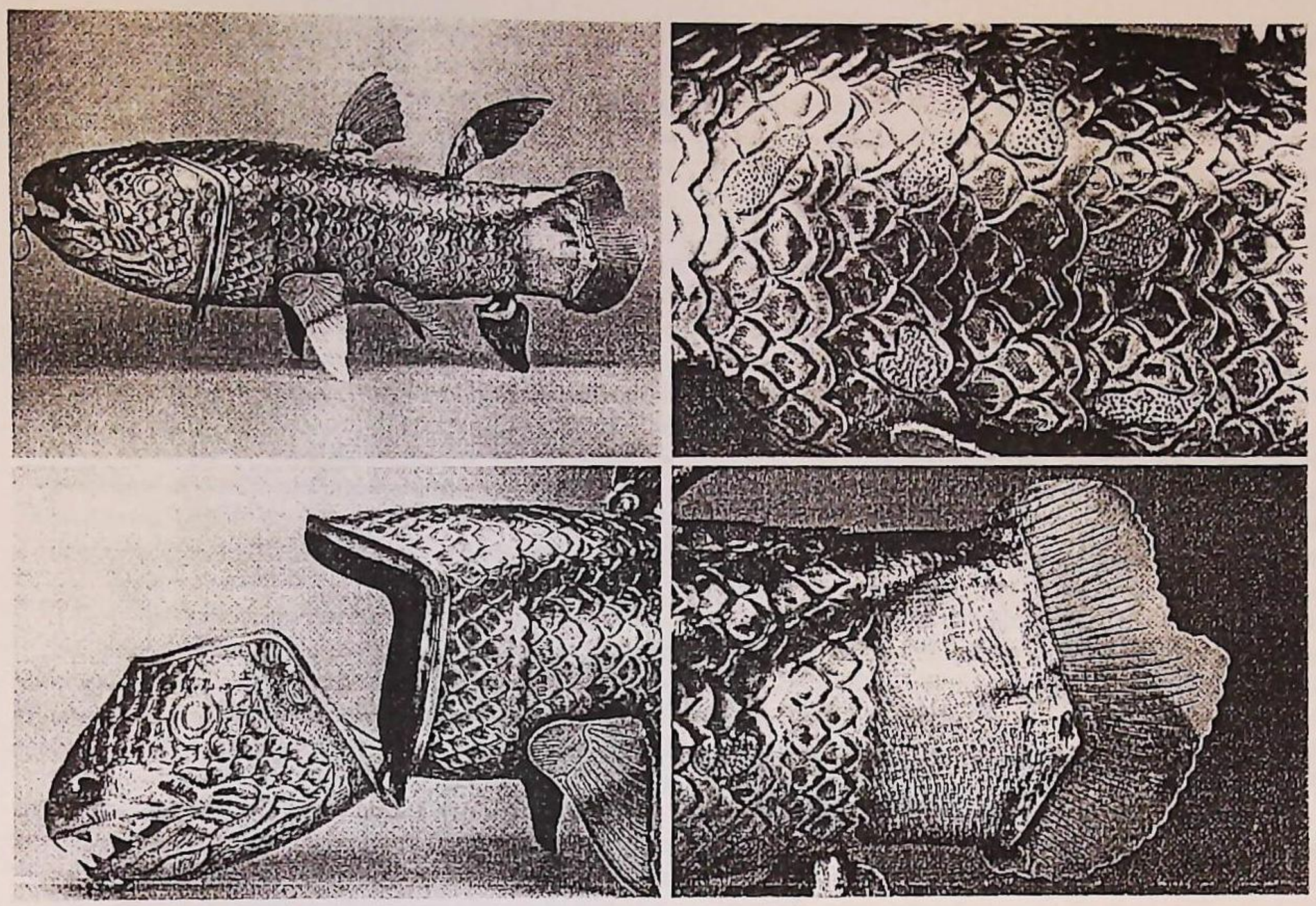

Fig. 6. Silver artifacts of probably Meso-American origin found by M. Steinert in an antique shop in Toledo, Spain. Note the line forged joint connecting head and body, the strongest hint for an old origin. The caudal fin was probably repaired. The silver engravings show scales and dot marks typical of the live fish

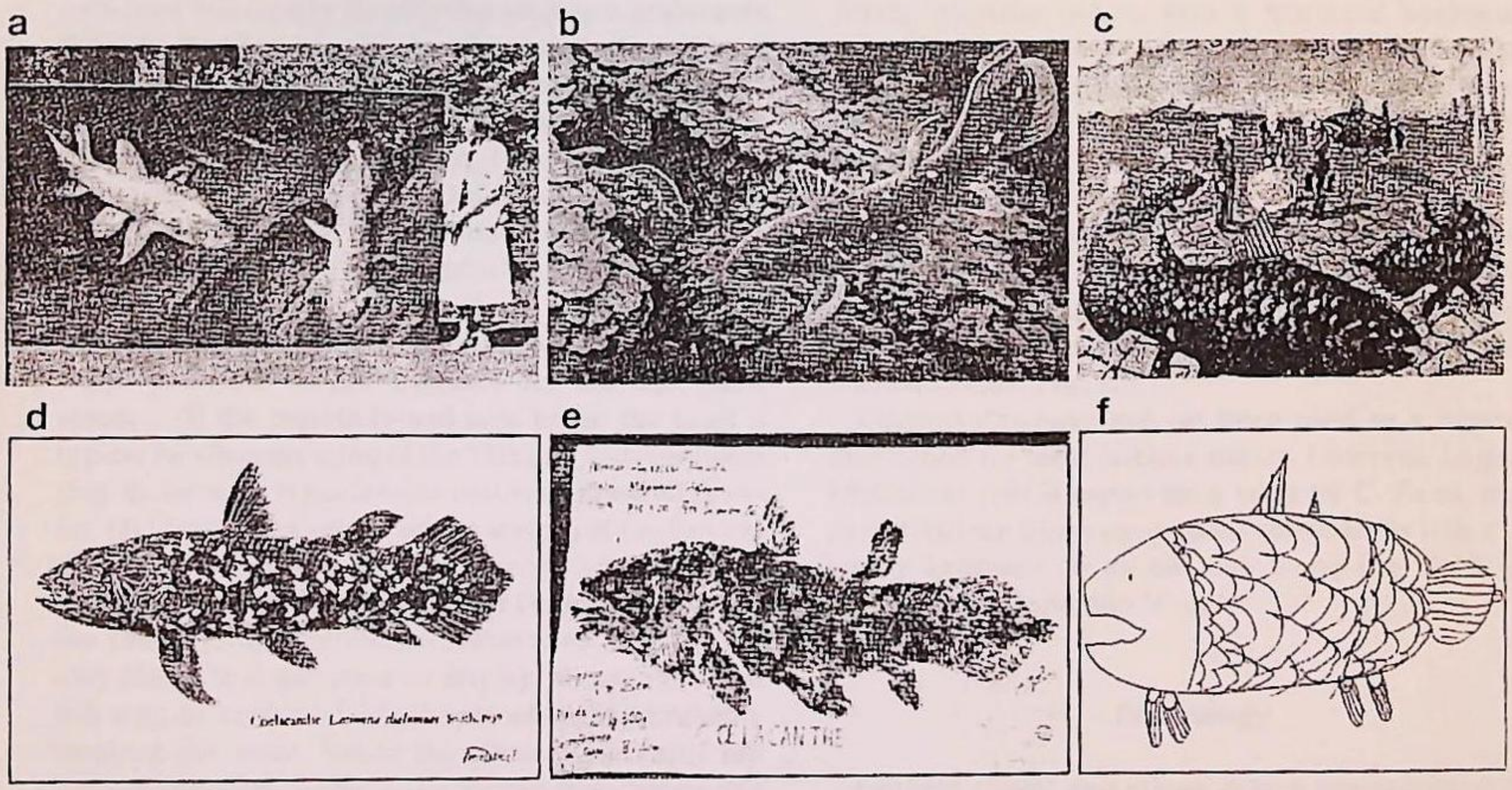

Fig. 7. Coelacanths in visual arts. (a) Painting by the illustrator R. Reynolds, England; (b) oil painting by D. Scott, England; (c) linocut 'Oncanthusphere' by H. Mann, South Africa; (d) illustration by B. Duhem, France; (e) Japanese gyotaku, produced in a Fishery School on Anjouan, Comores; (f) drawing by a boy, 7 years old, Germany

Nixon as a 'coelacanth of American anticommunism'; the 'Washington Times' described the political position, fossilized but still alive, of the African National Congress as the 'Coelacanth face of the ANC' and the German newspaper 'Süddeutsche Zeitung' compared the number of women in top positions of the German diplomatic corps with the rarity of coelacanths. In general, in ordinary linguistic usage, the term 'coelacanth' has been adopted to refer to rare, old-fashioned and conservative persons unable to cope with modern times but still alive due to their tenacity.

In poetry, F. M. Storey wrote about 'no progression' and 'no regression' in coelacanths and wondered how they survived. H. Shipp's stanzas in his dialogue on evolution explain why the coelacanth wants to stay as it is. Also O. Nash's 'Ode to a coelacanth' expresses adoration of the timeless existence of this old-fashioned genotype.

Fiction exploits the possible danger of a mesozoic creature surviving undetected in a hidden ecological niche. In 1954, coelacanths appeared as a model of the classic fictional film 'Monster of the Black Lagoon' directed by J. Arnold, while in 1992, L. J. Langley's writings created a society of vicious submarine vampires represented as coelacanths, a great danger for humans.

In the visual arts, coelacanths have a more positive appeal. Probably the oldest known coelacanth art works are 2 silver artifacts from Spain, one found in a church near Bilbao (this specimen is now lost), the other privately purchased in Toledo in 1964 (de Sylva 1966, Anthony 1976). The shape and position of the paired and unpaired fins clearly identify the work as a coelacanth (Fig. 6). Valdovinus (Prado Museum in Madrid; an authority on South American silver art) believes that the silver coelacanth is of Meso-American origin and was probably manufactured in the 17th or 18th century (pers. comm.). Spanish silversmiths of early centuries stamped their work to mark the date and place of origin. However, both silver coelacanths were without marks because Indian silversmiths were not allowed to stamp their work. R. Munoa, an expert on Spanish silver artwork, provided further evidence for the age (pers. comm.): (1) the minute forged joint below the head is typical for silversmithing of the 17th and 18th centuries (Fig. 6); later, such joints were cast and appeared heavier, (2) black silver oxides on the surface of the fish are old when compared to artifacts of recent origin.

Why was a coelacanth depicted? During purchase of the Toledo artifact by Steinert, other silver fish of probably identical origin were on display; all were unusual fish with exceptional body shapes which had probably inspired the artist. While the silver coelacanths are possibly the only works of art known from before the fish's scientific discovery, a variety of different works have been produced since (Fig. 7).

Inspired by the first films of coelacanths in their natural environment, the British illustrator R. Reynolds produced one of the largest known coelacanth paintings, measuring 180 × 280 cm, showing 2 coelacanths against a submerged lava slope (Fig. 7a). The painting was exhibited in South Africa. Numerous other naturalistic illustrations have been used as originals for popular and scientific books and articles or for other printing purposes, for example stamps, postcards or posters. Bruton (1995) focussed attention on a South African linocut by Hylton Mann entitled 'Oncanthusphere' (Fig. 7c), which, using coelacanths as a symbol for human excessive exploitation of fossil fuels, was characterized by 3 businessmen assembling around a coelacanth egg: the basis of life. The interruption of the coelacanth spiral (a spiral as a common feature in nature) with the fish disappearing into the background of an already desolated parched earth symbolizes the threat of extinction to both coelacanths and fossil fuels. In 1986, an exceptional Japanese gyotaku was produced, a whole-body-print documenting a caught coelacanth (Fig. 7e). The coelacanth has appeared also in many children's drawings. All of them depict the stalked fins and the little epicaudal fin (Fig. 7), visualizing 2 striking anatomical features unique to coelacanths.

The first caricatures and sketches with coelacanths as a motif appeared soon after the discovery. In Britain, a coelacanth was shown as an evolutionarily old and strange creature with the head of Neville Chamberlain and a swastika as caudal fin (Fig. 8a), illustrating the backboneless politician under the influence of the Nazis. Another sketch with a historical background appeared during the period of excessive nuclear tests. A group of coelacanths wonders '...why did our cousins bother to evolve into humans' (Fig. 8d). R. Day's famous drawing 'Because this is where the action is going to be' from 1966 (Fig. 8e) has a less threatening appeal and depicts the evolutionary transition of coelacanths from water to land on a lonely island. A number of private individuals have produced some fine graphics which were used as reminders of personal or annual events (Fig. 8f).

Coelacanths have not yet been used as a source of inspiration for local folklore music. However, Lagios & McCosker (1979) report on a song by C. Rand, and a South African blues song about coelacanths tells of the lonely existence of an old fish along the black lava slopes of the Comorian Islands.

Psychology

Oldfield (1995) and others define psychological values of biodiversity for all cases of psychological and intellectual benefits deriving from experiences of